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Safety Profile of Lansoprazole in Children and Adult Patients

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Abstract

The Benzimidazole derivative lansoprazole, which has antisecretory and antiulcer properties, lowers the acid secretion of parietal cells. Because of the acidic environment in these cells, lansoprazole is changed into active metabolites. It is quickly absorbed from a formulation resistant to stomach acid, and human plasma has about 97% of it bound. Lansoprazole's single dose pharmacokinetics seems to follow a linear pattern from 15 to 60 mg. Although food and the time of administration have an impact on absorption after single doses, they have no impact on the antisecretory action of successive doses. The cytochrome P450 enzymes CYP3A4 and CYP2C18 significantly metabolise lansoprazole into sulphone and 5-hydroxylated metabolites after oral treatment. Plasma contains two more compounds that have been identified sulphide and hydroxylated sulphone. The average plasma elimination half-life (t1/2) in healthy individuals ranges from 1.3 to 2.1 hours. Unchanged lansoprazole is not detectable in urine, however free and conjugated hydroxylated metabolites accounting for 15 to 23% of the total dose are. In comparison to H2-receptor antagonists, lansoprazole showed quicker symptom relief and better healing rates in individuals with stomach or duodenal ulcers or reflux esophagitis. In patients with Zollinger-Ellison syndrome, lansoprazole was more efficacious than H2-receptor antagonists and gave a similar therapeutic outcome to omeprazole. Like omeprazole or H2-receptor antagonists, lansoprazole is well tolerated and has a low frequency of side effects.

Keywords: Lansoprazole; Zollinger Ellison Syndrome; Reflux Esophagitis; Pharmacokinetics

Abbreviations: PPI: Proton Pump Inhibitor; GORD: Gastroesophageal Reflux Disease; NSAIDs: Non-Steroidal Anti-Inflammatory Drugs; TEN: Toxic Epidermal Necrolysis.

Introduction

A proton pump inhibitor (PPI) is a class of medication that includes lansoprazole. The stomach's lining contains enzymes called proton pumps that aid in the production of stomach acid, which is needed to break down food. The proper operation of proton pumps is hindered by lansoprazole. This lessens the quantity of acid the stomach produces.

The amount of acid produced by your stomach is decreased by lansoprazole. It is used to treat gastroesophageal reflux disease (GORD), heartburn, acid reflux, and indigestion. Additionally, stomach ulcers are treated and prevented using lansoprazole. The rare disorder known as Zollinger-Ellison syndrome, which is brought on by a tumor in the pancreas or intestines, can occasionally be treated with lansoprazole. The

only way to get lansoprazole is with a prescription. Tablets and pills are available [1].

A benzimidazole replacement known as lansoprazole (Prevacid, TAP Pharmaceuticals, Inc.) prevents the release of stomach acid. The short-term treatment of erosive reflux esophagitis, active gastric and duodenal ulcers, as well as the therapy of gastric and duodenal ulcers brought on by non-steroidal anti-inflammatory drugs (NSAIDs), is all covered by the approval of this medication. Additionally, as part of triple therapy with lansoprazole, clarithromycin, and amoxicillin, or dual therapy with lansoprazole and amoxicillin, it is approved for the long-term treatment of healed reflux esophagitis, healed duodenal ulcer, the treatment of hypersecretory conditions like Zollinger-Ellison syndrome, and the eradication of Helicobacter pylori (Figure 1).

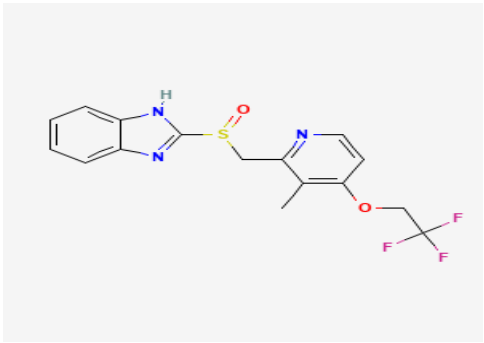

Figure 1: Lansoprazole.

Structure: Lansoprazole
Chemicals formula: C16H14F3N3O2S
Average weight: 369.361
Synonyms: Lansoprazol, Lansoprazole, Lansoprazolum.

Gastroesophageal Reflux Disease (GERD)

A common digestive condition known as gastroesophageal reflux disease (GERD) occurs when stomach contents pass backward through the lower esophageal sphincter and into the esophagus. This increases the chance of illness symptoms and stimulates the esophageal tissue [2]. Reflux in children is typically natural and does not cause issues. However, in other instances, it leads to a variety of pathological and a clinical abnormality in the oesophagus, whose diagnosis is primarily, depends on clinical symptoms, if untreated [3].

Children with GERD have a high prevalence, which is also accompanied by substantial treatment costs and adverse effects In investigations carried out within the Western references, reflux symptoms occur daily, weekly, and month to month 7, 14–19 cases, and 40% of cases, respectively [4]. Physiological reflux is frequently seen in newborns during infancy, especially in the first six months of life. Most of the time, symptoms go away between 12 and 24 months of age, but if newborns develop GERD, therapy should begin right away. Since the illness will create number of issues in infants if left untreated.

Pharmacokinetics of Lansoprazole

In healthy people, the pharmacokinetic profile of lansoprazole after oral dosage administration is well characterized. The drug is absorbed quickly and mostly completely, with absolute bioavailability surpassing 80% and mean peak plasma concentrations (Cmax) occurring about 1.7 hours after oral dosage delivery. Multiple dosage administration has no effect on the pharmacokinetics of lansoprazole because it does not accumulate. 97% of lansoprazole is linked to plasma proteins, while CYP2C19 and CYP3A4/5 extensively metabolize it to hydroxylated sulfinyl and sulfone derivatives with negligible to no antisecretory effect. Almost no unaltered lansoprazole is eliminated in the urine after a single dosage of lansoprazole is taken orally [5-9].

In general, lansoprazole's pharmacokinetic features in children and adolescents are like those in healthy adults [10,11]. The pharmacokinetics of lansoprazole, however, may be impacted by age, according to some research in the literature. For example, lansoprazole appears to be eliminated from the body more quickly in children than in adults during oral clearance (CL/F) [12]. A study of children aged 18 days to 14 years also revealed that, in comparison to adults, the elimination of lansoprazole was larger in infants (>29 days but 2 years of age) than in neonates (18 days of age) [13]. There is change in AUC of Lansoprazole in adult and neonates. AUC decrease with Increase in age [14].

Absorption: According to reports, lansoprazole has an oral bioavailability of 80–90% and reaches its maximal plasma concentration (Cmax) 1.7 hours after oral administration. Because food decreases lansoprazole absorption (both Cmax and AUC are decreased by 50–70%), patients should be advised to take lansoprazole before meals.

Distribution: Lansoprazole has an apparent volume of distribution of 0.4 L/kg [15]. Plasma proteins are 97% bound to lansoprazole. Over the concentration range of 0.05 to 5.0 g/ml, plasma protein binding is steady.

Metabolism: CYP3A4 and CYP2C19 metabolise lansoprazole mostly in the liver. The main byproducts are the lansoprazole sulfone derivative and 5-hydroxy lansoprazole [15]. These metabolites either have no antisecretory effect at all or very minimal. The proton pump [(H+, K+)-ATPase enzyme system] at the secretory surface of the stomach parietal cell is hypothesised to be blocked by two active species of

lansoprazole, which inhibit acid secretion. The systemic circulation does not include any of the two active species. While the acid-inhibiting activity of lansoprazole lasts more than 24 hours, the plasma elimination half-life is less than 2 hours. Because of this, lansoprazole's plasma elimination half-life does not accurately represent how long it suppresses stomach acid output.

Elimination: According to reports, lansoprazole is reportedly excreted in urine in amounts between 14 and 23%, with this range containing both conjugated and unconjugated hydroxylated metabolites [16].

Pharmacodynamic

By inhibiting H+,K+-ATPase, an enzyme that catalyses the last step in the acid secretion pathway in parietal cells, lansoprazole reduces stomach acid output [16]. Conveniently, lansoprazole can prevent both nighttime and daytime acid secretion when taken at any time of day [16]. As a result, lansoprazole is efficient at treating duodenal ulcers, lowering ulcer-related discomfort, and providing relief from heartburn symptoms [16].

Lansoprazole is a helpful therapy choice for hypersecretory diseases like Zollinger-Ellison syndrome because it also lowers pepsin secretion [16,17].

Safety and Evaluation

Toxicity

Abdominal pain, constipation, diarrhoea, and nausea are the most often reported side effects that occur more frequently in lansoprazole-treated patients compared to placebo. A case report of toxic epidermal necrolysis (TEN), a rare but severe cutaneous reaction, brought on by lansoprazole exists [18]. The hitherto healthy patient began using lansoprazole to treat peptic illness 15 days before presenting with symptoms of TEN [18]. Although the use of PPIs is infrequently linked to TEN, causation should be taken into account if a patient develops TEN soon after beginning a PPI [18].

If lansoprazole is excreted in human breast milk, it is unknown. It is important to note that lansoprazole has been used safely in babies, making it likely safe to use while nursing [19].

In Germany, lansoprazole is currently approved for the treatment of erosive reflux esophagitis, active gastric and duodenal ulcer disease, as well as long-term maintenance of healed reflux esophagitis and duodenal ulcer disease and the management of pathological hypersecretory conditions like Zollinger-Ellison syndrome. The purpose of this study was to evaluate the safety, effectiveness, and quality of life of patients receiving lansoprazole medication for up to five years [20].

Side Effect

This medication is well tolerated. In 7867 patients receiving lansoprazole treatment during clinical trials, a low rate of incidents has been recorded. Headache, fatigue, malaise, diarrhoea, abdominal pain, dyspepsia, nausea, vomiting, dizziness, constipation, flatulence, dry mouth or throat, rash, upper respiratory tract infections, urinary tract infections, arthralgia, and myalgia are some of these events, which are typically transient and self-limiting. Urticarial and pruritus are two skin responses. These typically go away when medication therapy is stopped. Although serious dermatological responses are uncommon, erythematous or bullous rashes, including erythema multiforme, have occasionally been reported. Additionally, reports of photosensitivity and hair thinning have been made. Jaundice, hepatitis, interstitial nephritis, allergy, wheezing, angioedema, and other events have also been observed. Bruises, purpura, petechial, depression, peripheral oedema, paraesthesia, blurred vision, taste disturbance, vertigo, confusion, and hallucinations are some of the symptoms. With continued use, gynecomastia and impotence may develop. Although some patients who were taking lansoprazole during clinical trials experienced abnormal liver function tests, routine monitoring of liver function tests is not necessary [21,22].

Overdose

On the effects of acute overdosage, there is no information. When there has been an overdose, supportive and symptomatic care should start.

Conclusion

In order to treat acid reflux and heat burn, lansoprazole is primarily utilised to lower acid levels. People of various ages receive prescriptions for lansoprazole. Both nursing mothers and pregnant women can use it. Lansoprazole is risk-free to use and rarely causes side effects. There is no specific gender dependant change in AUC. As per wt dependant dose AUC adult is lower than neonates.

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Conflict of Interest

There are no conflicts of interest between the two authors.

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